

REMARKS

In the Office Action, the Examiner rejected claims 1-37 under 35 U.S.C. §112, second paragraph. Claims 1, 19 and 37 have been amended to further clarify the subject matter regarded as the invention. Accordingly, it is respectfully requested that the Examiner withdraw all rejections under 35 U.S.C. §112, second paragraph.

Claims 1-37 are currently pending. In the Office Action, the Examiner rejected claim 1 on new grounds, namely, under 35 U.S.C. §102(b) as being anticipated by *Suzuki* (U.S. Patent No. 5,522,934). In addition, the Examiner has maintained the rejection of claim 1 under 35 U.S.C. §102(b) as being anticipated by *Ishii et al.* Furthermore, the Examiner has maintained the rejection of independent claims 19 and 37 under 35 U.S.C. §103(a) in view of one or more of the following U.S. patents: *Li et al.*, *Hartig et al.*, *Ishii et al.*, *Ueda et al.*, *Kadomura et al.* and *Moslehi et al.* Entry of this Amendment and reconsideration of the application are respectfully requested based on the following remarks.

REJECTION OF CLAIMS UNDER 35 USC §102(b)

In the Office Action, the Examiner rejected claim 1 under 35 U.S.C. §102(b) as being anticipated by *Suzuki* (U.S. Patent No. 5,522,934). In addition, the Examiner has rejected claim 1 under 35 U.S.C. §102(b) as being anticipated by *Ishii et al.*

In rejecting claim 1, the Examiner has asserted that *Suzuki* teaches flowing gas into a top central region 36A. (Office Action, page 4, first paragraph). Contrary to the Examiner's assertion, *Suzuki* does not teach flowing gas into a top region of a plasma processing chamber. Instead, *Suzuki* teaches flowing gas into a plurality of holes around the peripheral region of the plasma processing chamber. (Please see process gas injection holes 36A, 36B, and 36C located around the peripheral region of the plasma processing chamber). Thus, it is respectfully submitted that *Suzuki* does not teach flowing gas into at least two different regions including at least one peripheral region and at least one top region of the plasma processing chamber.

Claim 1, among other things, recites flowing gas into at least two different regions including at least one peripheral region and at least one top region of the plasma processing chamber. Furthermore, claim 1 recites that the peripheral region of the plasma processing chamber does not include any points of the top region of the plasma processing chamber. Thus, it is respectfully submitted that claim 1 is patentable over *Suzuki* for at least this reason alone.

Again, it is noted that *Ishii et al.* describes a control system for a processing system that includes an optical system (35) and optical sensor (36). As a result, light from a plasma generated in the processing system can be received by the optical sensor (36) through the optical system (35). In this way, a controller (37) can send control signals to the back-cooling gas source 15 and the process gas mass flow controller (28) on the basis of the feedback signals from the sensors (36) and (38). (*Ishii et al.*, Col. 6, 34-62). However, it should be noted that the process gas mass flow controller (28) flows the source gas (active or process gas) that is used to etch the substrate only from a top portion. Hence, *Ishii et al.* does not teach or suggest the source gas to be flown into at least two regions. Accordingly, there is no teaching and suggestion in *Ishii et al.* with respect to a gas flow system for controlling flow of source gas into at least two regions including at least one peripheral region and at least one top region of the plasma processing chamber. Thus, claim 1 is patentable over *Ishii et al.* for at least this reason alone.

In view of the foregoing, it is respectfully submitted that independent claim 1 is patentable over the cited art. Furthermore, claims that depend on claim 1 are patentable over the cited art for at least the same reasons as discussed above. Moreover, the dependent claims recite additional features that render them patentable for additional reasons. Therefore, it is respectfully requested that the Examiner withdraw the rejections made under 35 USC §102(b).

REJECTION OF CLAIMS UNDER 35 USC §103(a)

In the Office Action, the Examiner rejected claims 10, 11 and 19-37 under 35 U.S.C. §103(a) in view of one or more of the following U.S. patents: *Li et al.*, *Hartig et al.*, *Ishii et al.*, *Ueda et al.*, *Kadomura et al.* and *Moslehi et al.*

As conceded by the Examiner, there is no teaching or suggestion in *Ueda et al.* or *Kadomura et al.* with respect to a gas flow system as recited in independent claims 19 and 37. However, the Examiner asserts that the deficiencies of *Kadomura et al.* and *Moslehi et al.*, in this respect, are cured by one or more of the following U.S. patents: *Moslehi et al.*, *Li et al.*, *Hartig et al.*, and *Ishii et al.* However, as noted in the Amendment dated January 26, 2001, none of these references teach or suggest a gas flow system for controlling flow of source gas into at least two regions including at least one peripheral region of the plasma processing chamber. Moreover, independent claims 19 and 37 further require that the gas flow into at least one peripheral region and at least one top region of the plasma processing chamber.

Since independent claims 19 and 37 both recite similar elements, it is respectfully submitted that independent claims 19 and 37 are patentable over the cited art. Furthermore, claims that depend on claims 19 and 37 are patentable over the cited art for at least the same reasons as discussed above. Moreover, the dependent claims recite additional features that render them patentable for additional reasons. Therefore, it is respectfully requested that the Examiner withdraw the rejections made under 35 USC §103(a).

In view of the foregoing, it is respectfully submitted that claims 1-37 are patentably distinct from the cited references. Reconsideration of the application and an early Notice of Allowance are earnestly solicited. If there are any issues remaining which the Examiner believes could be resolved through either a Supplemental Response or an Examiner's Amendment, the Examiner is respectfully requested to contact the undersigned at the telephone number listed below. Applicants hereby petition for an extension of time which may be required to maintain the pendency of this case, and any required fee for such extension or any further fee required in connection with the filing of this Amendment is to be charged to Deposit Account No. 50-0388.

Respectfully submitted

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CROSS-REFERENCE TO RELATED APPLICATIONS

This application is related to the following concurrently filed U.S. Patent Applications:

- i) Application No.: [] 09/439,661 entitled "IMPROVED PLASMA PROCESSING SYSTEMS AND METHODS THEREFOR," [(Attorney Docket No.: LAM1P122/P0527)]
- ii) Application No.: [] 09/439,675 entitled "TEMPERATURE CONTROL SYSTEM FOR PLASMA PROCESSING APPARATUS," [(Attorney Docket No.: LAM1P124/P0558)]
- iii) Application No.: [] 09/440,418 entitled "METHOD AND APPARATUS FOR PRODUCING UNIFORM PROCESS RATES," [(Attorney Docket No.: LAM1P125/P0560)]
- iv) Application No.: [] 09/440,794 entitled "MATERIALS AND GAS CHEMISTRIES FOR PLASMA PROCESSING SYSTEMS" and [(Attorney Docket No.: LAM1P128/P0561-1)]
- v) Application No.: [] 09/439,759 entitled "METHOD AND APPARATUS FOR CONTROLLING THE VOLUME OF PLASMA," [(Attorney Docket No.: LAM1P129/P0561-2)]

Each of the above-identified patent applications is incorporated herein by reference.

IN THE CLAIMS

1. (Thrice Amended) A plasma processing system, said plasma processing system comprising:

a substantially cylindrical plasma processing chamber used to process a substrate, said substantially cylindrical plasma processing chamber including a top region and a peripheral region;

a gas flow system coupled to said plasma processing chamber, said gas flow system controlling flow of input gas into at least two different regions of said

plasma processing chamber; said input gas being a source gas suitable for use to etch [the] said substrate in [the] said plasma processing chamber;

wherein [the] said at least two different regions include at least one peripheral region and at least one top region of [the] said plasma processing chamber; and

wherein said peripheral region of said plasma processing chamber does not include any points of said top region of said plasma processing chamber.

19. (Twice Amended) A plasma processing system for processing a substrate, comprising:

a substantially cylindrical plasma processing chamber within which a plasma is both ignited and sustained for said processing, said plasma processing chamber having no separate plasma generation chamber, said plasma processing chamber having an upper end and a lower end;

a coupling window disposed at an upper end of said plasma processing chamber.

an RF antenna arrangement disposed above a plane defined by said substrate when said substrate is disposed within said plasma processing chamber for said processing;

an electromagnet arrangement disposed above said plane defined by said substrate, said electromagnet arrangement being configured so as to result in a radial variation in the static magnetic field topology within said plasma processing chamber in the region proximate said RF antenna when at least one direct current is supplied to said electromagnet arrangement, said radial variation being effective to affect processing uniformity across said substrate;

a dc power supply coupled to said electromagnet arrangement, said dc power supply having a controller to vary a magnitude of said at least one direct current, thereby changing said radial variation in said magnetic field topology within said plasma processing chamber in said region proximate said antenna to improve said processing uniformity across said substrate; and

a gas flow system coupled to said plasma processing chamber, said gas flow system controlling flow of input gas into at least two different regions of said plasma

processing chamber, said input gas being a source gas suitable for use to etch [the] said substrate in [the] said plasma processing chamber; [and]

wherein [the] said at least two different regions include at least one peripheral region and at least one top region of the plasma processing chamber; and

wherein said peripheral region of said plasma processing chamber does not include any points of said top region of said plasma processing chamber.

37. (Twice Amended) A plasma processing system for processing a substrate, comprising:

a substantially cylindrical plasma processing chamber within which a plasma is both ignited and sustained for said processing, said plasma processing chamber having no separate plasma generation chamber, said plasma processing chamber having an upper end and a lower end;

a coupling window disposed at an upper end of said plasma processing chamber.

an RF antenna arrangement disposed above a plane defined by said substrate when said substrate is disposed within said plasma processing chamber for said processing;

an electromagnet arrangement disposed above said plane defined by said substrate, said electromagnet arrangement being configured so as to result in a radial variation in the static magnetic field topology within said plasma processing chamber in the region proximate said RF antenna when at least one direct current is supplied to said electromagnet arrangement, said radial variation being effective to affect processing uniformity across said substrate;

a dc power supply coupled to said electromagnet arrangement, said dc power supply having a controller to vary a magnitude of said at least one direct current, thereby changing said radial variation in said magnetic field topology within said plasma processing chamber in said region proximate said antenna to improve said processing uniformity across said substrate; and

a gas flow system coupled to said plasma processing chamber, wherein [the] said gas flow system controls release of input gas, suitable for etching the substrate, into a first and a second region within [the] said plasma processing chamber, [the] said first region

being a top central region within [the] said plasma processing chamber and [the] said second region being a peripheral region of [the] said plasma processing chamber; and wherein said first and second regions do not have any points in common.